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The Status of the Genus Antineura Melander (Diptera, Agromyzidae)

By A. L. MELANDER, Riverside, California

Mr. Kenneth E. Frick, a student of the Agromyzidae, of the University of California, Berkeley, has referred to me a problem in nomenclature. I am grateful to him for furnishing some of the following data not available at Riverside.

In 1913 (Jour. New York Ent. Soc., XXI: 249) I erected the genus *Antineura* for three American species of Agromyzidae (*togata* n. sp., *chlamydata* n. sp., and *Phytomyza palliata* Coquillett), designating *togata* as the type of the genus.

In 1914 (Ent. Mitteil., III: 73) in an article dealing with Namensänderungen Friedrich Hendel called attention to the prior use of the name *Antineura* by Osten Sacken, in 1881, for a genus of Platystominae, and proposed the name *Haplomyza* to replace the homonym, without citation of the genotype, though mentioning that he knew an European species of the genus.

In 1918 (Arch. f. Naturges., 84A: 114, published in 1920) in the prodomus to his monograph of the palaearctic Agromyzidae Hendel separated *Haplomyza* from *Liriomyza* by the absence of the posterior crossvein. Disregarding the usual custom of retaining the genotype of the homonym, Hendel designated the European *xanthaspis* Loew as the type of *Haplomyza*. In this paper (page 145) Hendel gave a synoptic key to *atronitens* Hendel (? *heteroptera* Loew), *xanthaspis* Loew and *latigenis* Hendel, as the European species of *Haplomyza*. Based on their descriptions he mentioned the possible inclusion of *H. balonica* Strobl and *H. Tiefii* Strobl.

In 1927 (Zool. Anz., LXIX: 250) in Beiträge zur Systematik der Agromyziden Hendel thought that *Haplomyza* was polyphyletic and dismembered the genus, assigning *xanthaspis* and *latigenis* "without contraint" to *Liriomyza,* and *atronitens* to *Cerodontha.* Strobl's two species Hendel later placed in the subsequently erected genus *Xeniomyza.* Thus *Haplomyza* is left for the forgotten American species alone.

In 1932 (Flieg. pal. Reg., Agromyzidae, 59: 198) Hendel revived *Haplomyza,* this time as a subgenus of *Liriomyza,* again citing *xanthaspis* as the type. Six additional species were tabulated, but as all of them possess the posterior crossvein Hendel's concept of *Haplomyza* had completely changed.

In 1934 (Tijdschr. Ent., 77: 288–290) in Die Larven der Agromyziden, zweiter Nachtrag, deMeijere described a larva and puparium under the name *Xeniomyza* Hering, n. g. in litt; *X. ilicitensis* Hering, n. sp. in litt. He stated that the adult is the smallest known Agromyzid, and would be described later by Hering.

In 1936 (the concluding part of the Agromyzidae of the Fliegen der palaearktischen Region, p. 516) Hendel described the adult of *Xeniomyza,* citing it as *Xeniomyza,* n.g., Hering in litt, with genotype *X. ilicitensis,* n. sp., Hering in litt. Disregarding his former use of the name *Haplomyza,* Hendel stated that *Xeniomyza* is the same as the preoccupied *Antineura* Melander. According to nomenclatorial convention *Xeniomyza* should be credited to deMeijere, 1934, and not to Hendel, 1936, nor to Hering, because (1) the earlier description of a larva has priority over the later description of the adult, and (2) an author is held responsible for the names and descriptions he publishes and cannot convey authorship merely by citing "in litt."

Antineura Melander was originally characterized as differing from *Agromyza* by the absence of the posterior crossvein, while it differs from *Phytomyza* in that the costa extends to the fourth vein. The species have yellow humeri and nearly all of the head is also yellow. The postvertical bristles are strong. The base of the anal vein is distinct and the fifth vein is widely divergent.

In togata the fourth vein ends plainly before the tip of the wing; in *chlamydata* the end of the fourth vein bends back to terminate at the apex of the wing.

The European *Haplomyza,* as used in the Fliegen der palaearktischen Region, was separated from *Liriomyza* by having the humeri wholly brown to black, the head mostly black, only partly on the front and the cheeks yellowish brown, and the frontal orbits about one-third the width of the front. With this characterization the American species do not fully conform. Of the seven species placed in 1931 in *Haplomyza* only *xanthaspis* lacks the posterior crossvein, so at that time Hendel relied more on color and the structure of the front than on the incomplete venation.

Xeniomyza was defined as differing from *Liriomyza* mainly in the absence of the postvertical bristles, the termination of the fourth vein plainly before the tip of the wing with the costa extending a little beyond the fourth vein, the posterior crossvein completely lacking and the anal vein represented only as a fold. Again the American species do not concur.

Although many of the generic distinctions in the Agromyzidae are subject to wide variation, it appears that at least three lines of descent are represented here. Therefore the names *Antineura* Melander, *Haplomyza* as later construed by Hendel, and *Xeniomyza* deMeijere-Hendel-Hering do not all apply to only a single genus, i.e. the original homonym *Antineura.* Under the rules of nomenclature, *Antineura* Melander is definitely a homonym and is to be replaced by *Haplomyza* Hendel, 1914, which is a valid name published to take over the species placed in the preoccupied genus *Antineura.* But the genotype is still *togatus* Melander. If taxonomically the European species placed in the modified concept of *Haplomyza* are not congeneric with the three American species then they require a new generic, or subgeneric, name, for nomenclatively *Haplomyza* belongs irrevocably to *togatus* and its two related American species. The genus *Xeniomyza* has no direct relationship to *Antineura* Melander, and Hendel's citation of the synonymy is in error.

Mr. Frick has investigated the life cycle of *Haplomyza togata* from a long series of material, and has records of the larva, puparia, type of mine and adult genitalia. He informs me that the genitalia are very different from those of either *Liriomyza* or *Phytomyza*.

An Unnoticed Character in the Saturnioidea (Lepidoptera)

By Eugene G. Munroe, Institute of Parasitology, Macdonald College, Quebec, Canada

The conspicuous armature of spines or warts which characterizes the larvae of most of the Saturnioidea has attracted the attention of all workers who have studied this group. The characters presented by the more dorsal rows of spines are so striking that the less prominent but equally interesting subventral series (corresponding to primary setae vii in Forbes' system) appears heretofore to have been neglected.

It may be assumed that the primitive condition is that in which the subventral row is complete, being represented on each of the segments from thoracic 1 to abdominal 9. This complete distribution is seldom realized, in most genera the subventral spines being absent from some segments, while in a few forms the whole series is suppressed. The resulting distribution patterns appear to characterize major groups, and may some day prove useful in a definitive study of the classification of the superfamily.

Thanks principally to the magnificent illustrations in Packard's (1905; 1914) monograph, supplemented by descriptions and illustrations in Jordan (1922; 1924), Forbes (1923), Kirby (1907), and South (1920), and to a very limited extent by my own examination of preserved material, I have been able to ascertain the segmental distribution of the spines of this series in a fairly representative, though not very numerous, array of

species. Elements of uncertainty have of course arisen due to the necessity for dependence upon illustrations. In many figures the spines could not be seen, because of the position of the larva, lack of contrast in the coloration, or plain omission by the artist of spines which ought to have been visible. Packard almost never mentions the subventral spines in his descriptions. The paintings by Joutel and the photographs by Watson, however, proved to be particularly useful, and the only major gap in the data is the absence of information concerning the earlier instars of *Aglia* or any of the *Arsenura*-like forms, illustrations of which were not readily available to me, while Packard's descriptions are valueless from this standpoint.

The following table, summarizing the distribution of the subventral spines in the various forms, tends to err on the side of conservatism, spines which were not clearly visible in the illustrations or specimens, or specifically mentioned in descriptions, being omitted. In general I have simply avoided reference to any figure in which the distribution of the spines seemed doubtful. In the case of abdominal segment 9, however, many figures which were otherwise entirely satisfactory broke down; accordingly, in a number of forms in which no subventral tubercle is listed for segment 9 one will actually be found to be present. This does not apply, I think, to any of the Saturniinae (as here listed); I believe that all of these will prove to lack the subventral spine on that segment. I am not altogether satisfied as to the accuracy of the data for abdominal segments 7 and 8 in a few of the Hemileucinae, but I have followed the quite unequivocal illustrations, trusting to better informed students to correct any inaccuracies.

The later instars of the larvae of *Aglia,* the *Arsenura* complex, the Cercophanidae, and the Oxytenidae all have the armature greatly modified or suppressed, and the subventral tubercles are not recognizable. The earlier instars of *Arsenura,* and perhaps of other genera in these groups, have a more complete armature, but I have no information as to the arrangement of the subventral tubercles. Their disposition in the *Arsenura* group should be of particular interest.

Fragmentary as the data are, a characteristic segmental distribution of the subventral spines stands out clearly for each subfamily. A complete series is found only in the African *Bunaea* complex, where, however, it is of uniform occurrence,

Segmental Distribution of Subventral Spines in Certain Saturnioid Larvae

Subfamily Species	Instar	Subventral spines present on	
		thoracic segments	abdominal segments
Citheroniinae			
Adelocephala isias	V	1 to 3	1 and 2; 7 to 9
bicolor	II	1 to 3	1 and 2; 7 to 9
Anisota rubicunda	V	1 to 3	1 and 2; 7 to 9
virginiensis	I, II, V	1 to 3	1 and 2; 7 to 9
Eacles imperialis	I	1 to 3	1 and 2; 7 to 9
	II	1 to 3	7 to 9
Citheronia splendens	?	1 to 3	1 and 2; 7 to 9
laocoon	?	1 to 3	1 and 2; 7 to 9
sepulchralis	I to V	1 to 3	1 and 2; 7 to 9
regalis	V	1 to 3	1, 2, and 9
Hemileucinae			
Automeris pamina	IV	1 to 3	1 and 2; 7 to 9
io	I	1 to 3	1 and 2; 7 to 9
coresus	?	1 to 3	1 and 2; 7 to 9
viridescens	?	1 to 3	1 and 2; 7 and 8
Eudyaria venata	?	1 to 3	1, 2, and 7
Hemileuca maia	I	1 to 3	9
nevadensis	?	1 to 3	1 and 2; 7 and 8
juno	?	1 to 3	1 and 2
oliviae	?	1 to 3	1 and 2
Pseudohazis eglanterina	?	1 to 3	1, 2, and 7
hera	?	1 to 3	1 and 2; 7 and 8
Ludiinae			
Holocera smilax	last	1 to 3	none
Pseudoludia suavis	last	1 to 3	none
Ludia delegorguei	last	2 and 3	none
Bunaeinae			
Micragone herilla	?	1 to 3	1 to 9
Eudaemonia brachyura	?	1 to 3	1 to 8
argiphontes	?	1 to 3	1 to 8
Usta terpsichore	?	at least on abd. 3 to 6	
Urota sinope	last	1 to 3	1 to 8
Nudaurelia dione	last	1 to 3	1 to 8
wahlbergi	last	1 to 3	1 to 8
Acanthocampa belina	last	1 to 3	1 to 8
Gonimbrasia tyrrhea	last	1 to 3	1 to 8
Gynanisa isis	last	1 to 3	1 to 8
Bunaea alcinoe	last	1 to 3	1 to 9
Lobobunaea phaedusa	last	all tubercles suppressed	
Pseudobunaea tyrrhena	last	all tubercles suppressed	

Segmental Distribution of Subventral Spines in Certain Saturnioid Larvae—*Continued*

Subfamily Species	Instar	Subventral spines present on	
		thoracic segments	abdominal segments
Saturniinae			
Saturnia pavonia-major	last	1 to 3	1 and 2
Copaxa multifenestrata	I	1 to 3	1 to 5
Tropaea luna	V	1 to 3	1 and 2
Telea polyphemus	last	1 to 3	1 and 2
Antheraea yama-mai	I	1 to 3	1 and 2
	III	1 to 3	none
pernyi	I to IV	1 to 3	1 or none
Rhodinia fugax	I	1 to 3	1 and 2 or none
	II to IV	none	none
	V	all tubercles suppressed	
Dictyoploca japonica	I	1 to 3	none
	IV	1 to 3	none
Cricula trifenestrata	V	1 to 3	none
Attacus atlas	V	1 to 3	1 and 2
Callosamia promethea	III	1 to 3	none
	V	1 to 3	1 and 2
angulifera	IV	1 to 3	none
Eupackardia calleta	I to V	1 to 3	none
Rothschildia jorulla	I	1 to 3	none
	II to V	none	none
orizaba	III	none	none
Platysamia spp.	II to V	1 to 3	1 and 2, or 1, or none
Archaeoattacus edwardsii	?	1 to 3	none
Philosamia cynthia	I to V	none	none

except in the *Lobobunaea* group, in which the whole armature is lost. This would argue for a primitive position for the Bunaeinae, also indicated by the retention of distinct maxillary rudiments in some of the genera (*Eudaemonia, Micragone*). In the Citheroniinae, the other group in which distinct (and sometimes functional) maxillary rudiments are retained, the subventral spines have been lost from the segments which bear the mid-abdominal prolegs. A similar pattern is evident in the Hemileucinae, with the addition of a tendency for the loss of the spines from the posterior three segments.

In the otherwise very dissimilar Ludiinae and Saturniinae, the larvae agree in having lost all the subventral tubercles behind the second abdominal segment. There is also a tendency

toward suppression of these tubercles on the anterior segments, to an extent which varies, sometimes in the same instar of the same species. One, and perhaps a very significant, exception is found in the first instar larva of *Copaxa multifenestrata,* as depicted by Joutel in Packard (1914). It is doubtless dangerous to base a general conclusion on a single drawing, but the suggestion is strong that in the Saturniinae the posterior subventral tubercles were lost before the middle ones. This would preclude any direct relationship with the Hemileucinae, whose affinities would on the contrary appear to be with the Citheroniinae. The *Copaxa* larva is also primitive in showing no trace of a displacement mesad of the dorsal tubercles of the eighth abdominal segment, and of course South America is a well known asylum for primitive forms.

The Saturniinae and Bunaeinae are at opposite extremes in the number of subventral tubercles, a fact which provides additional support for their separation, proposed by Packard long ago on the basis of differences in the early stages. In spite of the close similarity of the adults, we can hardly derive the Saturniinae directly from the Bunaeinae, for the latter are more specialized than *Copaxa* and other primitive Saturniines not only in having the dorsal tubercles of the eighth abdominal segment fused in the mid-line, but also in the general exaggeration of the larval armature and in having lost the faculty of spinning a cocoon. It is easier to assume that both groups arose from a common ancestor which spun a cocoon, and in which the subventral series of tubercles was complete and the dorsal pair on the eighth abdominal segment separate.

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A New Species of Andrena from Texas, with Descriptive and Synonymical Notes on Andrena belfragei Cresson (Hymenoptera: Apoidea)

By U. N. LANHAM, Department of Zoology, University of Michigan

The new species described herein is based on a series in the United States National Museum which had been given a manuscript name by Viereck. The unusual color pattern of the female in this species, approached by only one other species in the United States, makes it easily recognizable in our fauna.

Andrena dolomellea new species

Female. Integument mostly ferruginous, with details of coloration as follows: clypeus, adjacent areas of face, base of mandibles, scape, pedicel, first flagellar segment, and lower one-half of cheeks ferruginous, rest of head black; mesoscutellum, metanotum, lower one-third of pleura, and dorsal surface of propodeum with strong feruginous markings and tints, rest of thorax black, legs entirely ferruginous; anterior terga feruginous, posterior terga becoming blackish; all pubescence rich fulvous. Clypeus closely, irregularly, and rather weakly punctate, the lower half slightly shining, with a poorly developed median ridge; facial fovea wide above, occupying more than three-fourths distance between eye and lateral ocellus, terminating at about level of clypeal margin; process of labrum large, broadly truncate, truncature slightly concave; mandibles ordinary, with ventral membraneous flange short; antennae with segment 3

about equal to 4 + 5. Mesoscutum with moderately short pubescence, not nearly dense enough to obscure integument, integument reticulate, with dense, large, but rather weak punctures; mesoscutellum reticulate, with sparse punctures; metanotum strongly protuberant; enclosure of propodeum reticulate, with a few weak, irregular wrinkles above; propodeal corbiculum with dorsal fringe well developed, no anterior fringe, but hairs of anterior portion branched, interior with dorsal one-half hairy; tibial scopa copious, hairs of outer face simple, trochanteral floccus imperfect, middle basitarsus not conspicuously widened at middle; wings uniformly and strongly darkened, stigma black, moderately slender, first recurrent nervure ending slightly before middle of second submarginal cell. Terga strongly punctate, first tergum with few punctures on elevated portion, closely punctate on depressed posterior margin, remaining terga closely and evently punctate, with punctures of fourth tergum becoming indistinct; caudal fimbria bright fulvous; pygidium broadly rounded at apex.

Length 13 mm., forewing 11 mm.

Holotype female: Willis, TEXAS, April, 1903 (Bridwell).

Male. Black, except legs and most of terga ferruginous; pubescence fulvous. Head with pubescence of face rather short; cheeks somewhat wider than eyes, broadly rounded; mandibles moderately long, decussate; antennae with segment 3 about equal to 4. Wings lighter than in female, but still well darkened, especially apically. Tergal sculpture about as in female. Genitalia with tips of parameres long, slender, parapenial lobes moderately produced, broad; sagitta with sides not excavated, widened for about half its length; tip of eighth sternite moderately and evenly expanded, apical margin slightly concave.

Length 11 mm., forewing 9 mm.

Allotype male: same data as holotype. *Paratypes:* 2 females, same data as holotype, one bearing an additional label *"Crataegus";* one female, Fedor, Texas (Birkman): 1 female, Mound, Louisiana, 2 April 1907 (F. C. Bishopp) and one male, same locality, 7 March 1907, on turnip (Bishopp).

In spite of its bizarre appearance, produced by the ferruginous markings of the face, thorax and abdomen, this species is structurally a normal member of the *vicina-hilaris* series, as shown by the imperfect trochanteral floccus, simple hairs of the scopa, and slender parameres of the male genitalia. It is most like *hilaris* Smith, differing in the much more closely punctured terga and the larger size. *A. mellea* Cresson, the only other North American *Andrena* known to me to have ferruginous markings on the thorax, has the posterior spur of the hind tibia strongly bent and flattened basally (linear in *dolomellea*), and has the pleura coarsely sculptured, therefore belonging to the group of *A. argemonis* Ckll. and *A. prunorum* Cockerell, a group not at all related to the present species.

A. dolomellea is another example of ferruginous members of an otherwise black series of bees occurring in the southern United States. The subgenus *Pterandrena,* elsewhere a group of black bees, has at least one reddened species in Southern Kansas and Texas.

Andrena belfragei Cresson

Andrena belfragei Cresson, 1872, Trans. Amer. Ent. Soc. 4: 256, female.
Andrena brunniventris Cresson, 1872, Trans. Amer. Ent. Soc. 4: 258, male. (New synonym.)
Andrena texana Howard (not Cresson), 1901, Insect Book, plate 4, fig. 7.

In order to eliminate the possibility that *A. dolomellea* might be the same as *A. brunniventris,* described very briefly by Cresson from a single male, Dr. Karl V. Krombein compared the allotype of *dolomellea* with Cresson's type for me, and found them to be distinct. Mr. P. H. Timberlake further investigated the matter, and found in the collection of the U. S. National Museum a male specimen from Texas ("Collection Belfrage") which had been determined by Ashmead as *A. belfragei* Cresson; Mr. Timberlake compared it with the type of *brunniventris* and thought them to be the same. This male specimen is the one figured by Howard in the Insect Book, plate 4, figure 7, as *A. texana.* Comparison of the specimen with a female *belfragei*

loaned by the U. S. National Museum (from "Tex., Collection Belfrage") leaves little doubt that it is actually the male of this species. *A. belfragei* belongs to a group of species related to *Andrena carlini* Cockerell, characterized by the perfect trochanteral floccus of the female and the expanded tips of the parameres in the male genitalia; otherwise, the group closely resembles the *vicina* series. The species is characterized in this group by the densely and strongly punctured abdominal terga; it agrees with *A. viburnella* Graenicher in this respect, and further study may show *viburnella* to be only a darker (black instead of slightly reddened) northern race of *belfragei*.

Monarch Butterfly Migrating in Botetourt County, Virginia

By JOHN H. FALES, U. S. D. A., Agr. Res. Admin., Bureau of Entomology and Plant Quarantine

At noon on September 28, 1941, while driving north on Route 11 about 5 miles from Roanoke, Virginia, we noted monarch butterflies (*Danaus plexippus* L.) flying across the highway to the south. It was a clear day with a temperature of 90° F., and a southerly breeze was blowing. When we stopped we saw 25 butterflies in several minutes and in one 60-second period noted 6 crossing the roadway. Nine more crossed the highway in less than a minute. These insects flew at an altitude of 2 to 20 feet, crossing the highway at about 7 per minute at this point. This was at the rate of 420 per hour. A heavy migration was definitely in progress.

As we continued our journey we saw numbers of dead monarchs on the highway. At Troutville, Virginia, we counted 9 monarchs lying on the highway within a quarter of a mile.

Proceeding northward to Natural Bridge and Lexington, Virginia, we saw other monarchs in flight and on the highway. We saw several on Blue Ridge Mountain and on Mt. Long at an elevation of 2,000 feet or more.

Some Observations on Megarhyssa (Hymenoptera, Ichneumonidae)

By P. W. Fattig, Emory University,
Emory University, Georgia

On June 25, 1947, Professor J. T. Darlington took me about two miles from the Emory University campus to a beech tree on which he and Richard Smith had found two *Megarhyssa macrurus* (Linn.) and one *M. atrata* (Fabr.) ovipositing on May 20th. Mr. Smith returned to this tree on May 30th and found four *M. macrurus* and one *M. atrata* ovipositing.

This tree was heavily infested with *Megarhyssa* and *Tremex columba* (Linn.). I counted 217 emergence holes on the exposed, decayed portion, which was about three feet high, thirty inches wide at the ground and twelve inches wide at the top.

On July 27th I observed a specimen emerge with the ovipositor separated into three pieces for nearly an inch. I was under the impression that there were only two sheaths and an ovipositor, not knowing that the ovipositor itself was made up of three valves. After this discovery, I worked about twenty hours trying to separate the ovipositors of nine specimens. I succeeded in getting three specimens separated entirely, and two more almost entirely separated when one of the valves broke off.

On August 4th I began marking the wings of twelve *Megarhyssa atrata* females with white duco paint. All of the marked specimens returned to the tree and oviposited at least twice, number 5 ovipositing twelve times, and number 8 nine times. Number 5 oviposited three times within three hours.

Two large decayed roots about six inches apart, extending out from the base of the tree, gave a good chance to get many close-up views of the position and operation of the membrane within the sixth and seventh tergite in relation to the sheaths and ovipositor while the insects were inserting and withdrawing the ovipositor. I was able to get my eyes within six inches of the extended membrane, since *Megarhyssa* practically always oviposited with the head downward. The looped ovipositor extends the membrane, with the two sheaths within the membrane

during the drilling or inserting process; then as the drilling nears completion, the circle formed by the sheaths becomes smaller and smaller until very little can be seen, when they give a sort of flip and appear on the outside of the membrane, with one sheath on either side. Thus, when the ovipositor is being inserted, the sheaths are on the inside of the membrane, but when withdrawing, the sheaths are on the outside.

On April 30th, 1948, I painted twelve male and seven female *M. atrata,* and continued painting female *M. atrata* until May 12th, when I painted the eighteenth female. I saw all of the marked females return and oviposit except numbers 8 and 15. Number 2 oviposited only four times, while number 6 oviposited fifteen times until June 1st, when the observations were discontinued. I do not know how many times these marked specimens returned and oviposited while I was not observing the tree.

On May 1st I observed three male *M. atrata* with about one-half inch of their abdomens inserted in one hole, with several other males trying to insert the end of their abdomens. About every 10 to 12 seconds the three males would give their wings and abdomen a quivering jerk. After fifteen minutes the three males withdrew their abdomens, and in two minutes a female *M. atrata* appeared at the entrance of the hole and crawled out; thereupon one of the males mated with her at once. While this was going on there was another group of male *M. atrata* about one foot farther down on the tree, going through the same movements. The second female appeared twelve minutes later. I counted 32 males in the two groups, all being *M. atrata,* except 3 *M. macrurus,* and 2 *M. greenei* Vier. The males had become so tame that I was able to get within a foot or two of the tree without disturbing them.

On May 2nd one male *M. atrata* began trying to insert its abdomen into a small hole in the wood at 7:50 A.M., a second at 7:53, and a third at 7:58; one male withdrew his abdomen at 9:00, a second at 9:20, and a third at 9:22; the head of a female *M. atrata* appeared at 9:24, and she crawled out at 9:28 and mated as soon as she was out of the hole, and apparently mated

twice while crawling up the tree. There was great confusion amongst the 12 to 15 male *M. atrata* present.

At 9:30 A.M., May 3rd, number 3 male *M. atrata* was observed with its entire body inserted in a hole with only the white painted tip of the wing exposed. He withdrew at 9:47, and a female *M. atrata* crawled out of the hole at 9:54, when another male mated with her. I also observed three other males with only the tip of the wing extending out the hole. I presume that these males were trying to enlarge the holes so that the females could emerge.

At 12:30, May 3rd, I observed number 3 female *M. atrata* with her entire body inserted in a hole, with only about half of her wings protruding. The abdomen was withdrawn at 12:48, and the sheaths at 12:53, the abdomen was again almost entirely inserted at 1:16, and was not withdrawn at 2:00, when I had to leave the tree. At 3:00, when I returned, the abdomen was again withdrawn, and at 3:15 she inserted her abdomen for the third time. I also observed number 7 and number 10 with their entire bodies inserted with only the tips of their wings exposed; and number 6 and number 9 with their entire bodies inserted with the sheaths and the tips of their wings exposed.

During 1948 *Megarhyssa atrata* (Fabr.) was the predominant *Megarhyssa* at the beech tree. During July 1947 I collected 36 specimens of *M. atrata,* 32 of *M. macrurus* (Linn.) = *M. lunator* (Fabr.), and 18 of *M. greenei* Vier. From July 20th to August 22nd, I collected 28 specimens of *Tremex columba* Linn. and saw many more while observing the *Megarhyssa.* They would emerge and drop to the ground amongst the beech leaves, and then almost at once they were off in a flash. I observed only one *Tremex* ovipositing, and this was at 6:00 A.M.; possibly I was late in getting out to the beech tree.

Sometimes there were as many as fifteen female *Megarhyssa* on this tree at a time, with as many as nine ovipositing at one time.

I wish to thank Dr. H. K. Townes for determining the *Megarhyssa* and *Tremex,* and for criticizing the manuscript.

Notes on Two West Indian Mutillidae (Hymenoptera)

By KARL V. KROMBEIN, Bureau of Entomology and Plant Quarantine, Agricultural Research Administration, United States Department of Agriculture

Some years ago Mickel (Psyche, 35: 27, 1928), in a list of West Indian Mutillidae, assigned the Jamaican *Sphaerophthalma cargilli* Cockerell (Psyche (suppl.), 7: 16, 1895; ♀) to *Dasymutilla*. A recent study of the type, in connection with the identification of two females submitted by C. Bernard Lewis, curator of the Science Museum of the Institute of Jamaica, shows that the species is more properly referrable to *Pseudomethoca* (new combination), because of the large quadrate head, elongate first flagellar segment, and absence of carinae delimiting a pygidial area. The erroneous assignment to *Dasymutilla* was undoubtedly due to the character of the first abdominal tergite, the apex of which has a somewhat diskiform appearance as in certain *Dasymutilla*.

The species was omitted from Schuster's key (Bul. Brook. Ent. Soc., 40: 7, 1945) to West Indian *Pseudomethoca* because of the erroneous generic assignment. The species is apparently closest to *P. olgae* Schuster from St. Croix, but is immediately separated from it and the other West Indian species by the broad ferruginous stripes laterally on the posterior part of the dorsum of the thorax, and by the almost totally ferruginous first abdominal segment.

Ephutopsis trinidadensis Ashmead is also omitted from Mickel's list of West Indian species, presumably because he argues (Bul. 143, U. S. Natl. Mus., p. 32, 1928) that it is invalid since it was never described. I cannot agree with this interpretation, for Ashmead states (Canad. Ent., 36: 6, 1904), "Metathorax with the hind angles dentate, clothed with a dense silvery-white pubescence; scutellum bispined. (North and South America) . . . *Ephutopsis* Ashm., gen. nov. (Types *E. trinidadensis* Ashm., and *M. odontophora* Cam.)." These char-

acters serve as the specific as well as the generic description. The type, a male from Trinidad, West Indies, July 1899 (F. W. Urich), is before me, and is herewith placed in the genus *Ephuta* (new combination). Schuster (Rev. de Ent., 16: 190, 1945) considers *Ephutopsis* to be at most a subgenus of *Ephuta*. If the former is valid, it must be used for the group containing *odontophora,* its genotype, whereas *trinidadensis* belongs to the group containing *furcillata* Mickel and *forceps* Schuster.

The following brief notes will serve to amplify Ashmead's description of *trinidadensis* and aid in its identification. It appears closest to the Cuban *furcillata* Mickel, agreeing with that species in the hyaline wings with infumated apical margins, the absence of black pubescence and the presence of a pair of teeth on the scutellum and a median tooth on lateral margin of dorsum of propodeum. The following points of difference from *furcillata* are apparent from Mickel's description of that species (Psyche, 35: 25–6, 1928): Length 6.2 mm.; seventh sternite creamy on basal half; second sternite without an apical band of silvery hairs, these present only laterally; first segment of flagellum three-fourths the length of second (almost equal in *furcillata*); front and vertex with coarse, contiguous punctures (moderate scattered ones with granular interspaces in *furcillata*); second tergite with circular, subcontiguous punctures (elongate ones in *furcillata*).

Review

INTROGRESSIVE HYBRIDIZATION. By Edgar Anderson. John Wiley & Sons, Inc., New York. Chapman & Hall, Limited, London. 1949. Pp. ix + 109. Price, $3.00.

A good new name for an old concept often serves both to advertise and to integrate the idea. "Introgressive hybridization" has been practiced by plant and animal breeders and has been recognized as at least a partial explanation for variation in natural species since early times. It was not until 1938 that the name was given in an article by Anderson and Hubricht

(Am. J. Botany, 25:396–402) in which the process was specifically discussed.

As an example drawn from animal breeding, a dominant trait occurring in one breed may be transferred to a second breed by crossing followed by grading. The first generation hybrids are backcrossed to the second breed, their progeny showing the desired trait are selected and again backcrossed, and this process is continued until the mongrels come more and more to resemble the "recurrent" parental breed, except for the desired trait which is retained each generation by selection. In poultry, colors may be thus transferred from one breed to another.

As a natural process, white spotting or other markings may thus infiltrate into a wolf population after crossing with dogs and the recessives blue eyes or red hair of white human stock may be transferred to the negro race, cropping out after many generations, as if by mutation.

Dr. Anderson's book deals with plant material under "natural conditions," that is outside the laboratory and the breeding plot. These conditions include not only normal habitats to which the organisms are adapted and which tend to keep races or species distinct, but also abnormal environments due to fires, floods or hurricanes or to human activities producing clearings, dumps and garbage piles, as niches in which "hybrid swarms" may develop with new combinations of characters segregating after crossing.

As a typical example of introgression, a summary is given (Chapter 1) of the results of intensive studies of variation in Irises in the Mississippi delta after natural crossing of two widely distinct species. Man has there "hybridized the habitat" giving an opportunity for an appreciable number of segregating types to survive.

The Ecological Basis (Chapter 2) and The Genetic Basis (Chapter 3) of Introgression are discussed. Normal environment and normal heredity tend toward keeping races and species distinct but permitting a small amount of genic flow after crossing. Several pages are devoted to the cohesive

effect of genetic linkage. Here the reader will find some rather obscure mathematics, which, in the opinion of the reviewer, might better have been either more fully elaborated or else omitted. As it stands, it appears somewhat unconvincing since some of the premises are apparently made up to suit the case and there are errors at least of omission in the line of argument. The general thesis that linkage has a cohesive effect, is, however, sound. The author fails to mention several genetic factors other than linkage that may be equally significant as cohesive agents.

The section on Character Association as a Criterion of Hybridity should be of interest and value. Introgression in Finite Populations (Chapter 4) gives us more mathematics, which is here clearly, adequately and convincingly presented. The discussion of Introgression and Evolution (Chapter 5) is sound and critical and is treated in such a way that the ideas may be readily grasped. The general conclusions should be of interest to entomologists and the Special Techniques (Chapter 6) may well find application to a study of introgression among insects and other animals.

The bibliography is mostly botanical. The noteworthy biometrical studies of Alpatov on races of honey bees are cited. These indicate speciation rather than mutation and should furnish the basis for further work of both practical and theoretical importance.

As an Epilogue the author modestly states "How important is introgressive hybridization? I do not know." Bizarre hybrid swarms are probably less significant than the wide dispersal of introgressive genes. He emphasizes the paradox "Introgression is of the greater biological significance, the less is the impact apparent to casual inspection."

The reviewer highly recommends the book to entomologists who are interested in the broad biological aspects of their subject. Those who find the mathematics too difficult can skip it. For those who find it intriguing, an elucidating appendix would have been helpful.

P. W. WHITING

Current Entomological Literature

COMPILED BY RAYMOND Q. BLISS AND R. G. SCHMIEDER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the year 1949 unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For other records of general literature and for economic literature see the Bibliography of Agriculture, Washington, and the Review of Applied Entomology, Series A, London. For records of papers on medical entomology see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of periodicals and serials published in our January and June issues. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

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